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ORIGINAL ARTICLE

Primary-care physicians' patient referral patterns to private versus public hospitals for orthopaedic or trauma surgery — French Sentinels® database, 1997—2011

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KEYWORDS
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Summary
Background: In France, primary-care physicians referring patients for admission can choose between public and private hospitals. The factors that govern their choices are unknown.
Methods: Among all patient admissions reported from 1997 to 2011 by primary-care physicians participating in the Sentinels® network, we identified those due to orthopaedic conditions or trauma. We then identified the factors associated with referral to a private hospital rather than to a public hospital.
Results: Of 45,960 admissions reported to Sentinels® in 1997—2011, 2794 (6.1%) were for orthopaedic/trauma care. The main reasons for admission were hip fractures (27.5%), elective orthopaedic surgery (15.5%), fractures of the humerus (5.9%), wrist fractures (5.4%), soft-tissue lesions of the forearm or hand (5.0%), and spinal injuries (4.5%). Private hospitals were chosen more often for orthopaedic/trauma patients than for patients with other conditions (40% vs. 21.6% of cases, $P < 0.0001$). When fracture of the humerus was used as the reference, referral to private hospitals was significantly more common for elective surgery (odds ratio, 3.30 [2.02—5.40]) and hip fracture (odds ratio, 1.50 [1.03—2.18]) and significantly less common for

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spinal injuries (odds ratio, 0.35 [0.19—0.66]). Other factors associated with referral to private hospitals were patient age, admission decision during an office visit or in a non-emergent setting, and admission decision made by the patient's usual physician. **Conclusion** Specific factors seem to govern decisions by primary-care physicians to refer orthopaedic/trauma patients to private vs. public hospitals. Identical pricing scales for private and public hospitals will be implemented soon in France, a change that requires further analyses.
Level of evidence: Level IV.

Introduction

Hospitals in France include public, non-profit private, and for-profit private institutions. The public hospital system comprises both public hospitals and 71% of non-profit private hospitals and has 440 427 beds (334 101 public and 106 326 private), i.e., three-fourths of all hospital beds in France [1]. In 2008, of 2784 French hospitals, 1522 belonged to the public hospital system.

Patients may choose between private and public hospitals themselves (for instance when an emergency occurs). However, primary-care physicians (PCPs) play a central role in referring patients to one or the other sector [2]. They fulfill unique liaison responsibilities between community-care and the hospital system, and their role in admission decisions has been firmly established [3—5]. However, few published data are available on the practice patterns of PCPs regarding choices between the public and private sectors or the factors that influence those choices [6]. For instance, for orthopaedic and trauma patients, whether the nature of the health condition or patient characteristics influence the choice is unknown. Information on the reasons that govern referral patterns would be useful, as pricing scales for a given surgical procedure differ across institutions [7].

Here, our objective was to evaluate the factors that govern decisions by PCPs to refer orthopaedic/trauma patients to public vs. private hospitals.

Material and methods

The Sentinelles® network

We identified all patient admissions reported from 1997 to 2011 by PCPs participating in the Sentinelles® network, a research and health surveillance network created in 1984 by the National Institute for Health and Medical Research (Inserm) and the Pierre-and-Marie-Curie University. The Sentinelles® network is composed of 1313 office-based PCPs distributed throughout France (i.e., 2.2% of all PCPs with community-care activities in continental France [8]). The data collected by the network PCPs are analysed and used for projections and real-time redistribution. The network PCPs are representative of all community-care PCPs in France in terms of age and patient population; however, males are over-represented, mean age is older, number of patient visits is larger, and fewer network PCPs work on a part-time salaried basis [8]. The objectives of the network are to monitor selected health conditions and to establish projections in time and space. The monitored health conditions consist of several communicable diseases frequently managed by community-care PCPs (flu-like syndromes, acute diarrhoea, mumps, chickenpox, herpes zoster, male urethritis, and Lyme disease), as well as three non-infectious events (hospital admission, suicide/attempted suicide, and asthma attacks). The network PCPs use the Internet to feed data on these ten indicators to the database. In 2011, 359 (27.3%) of the 1313 participating PCPs sent information to the Sentinelles® database [9]. The proportion of actively participating PCPs remained stable overall throughout the study period [8].

Reported admissions

For the Sentinelles® database, admissions are defined as ''any admission decision made during a visit''. We identified all patients with admissions reported between 1997 and 2011. The admission reporting form includes an open question on the reason for admission and collects the age and gender of the patient, whether the PCP is the patient's usual physician, where the admission decision was taken (physician's office, patient's home, nursing home, other), the degree of urgency (not urgent, simple emergency, ICU referral), and the sector chosen (public hospital, private hospital belonging to the public system, other private hospital, or home care).

For this study, among patients with admission decisions, we identified those with orthopaedic conditions or trauma as the reason for admission. We then identified those patients with the six most common reasons for admission: hip fractures (all femoral neck fractures, fractures complicating a previous prosthesis or fixation, and prosthetic loosening), fractures of the humerus, wrist fractures, soft-tissue lesions of the forearm and hand (wounds and infections), injuries of the spine, and scheduled surgical procedures. This analysis allowed us to determine whether the reason for admission influenced the choice between the public and private sectors. We also assessed the impact on this choice of patient characteristics (age and gender) and of the setting (site of the PCP evaluation, whether the PCP was the patient's usual physician, and degree of urgency).

Statistical analysis

Descriptive statistics were computed. Qualitative variables were described as percentages then compared using the

Chi-square test. We then built a logistic regression model to identify variables independently associated with the choice between the public and private sectors (binary qualitative variables). We entered six co-variates into the model: patient age (indicative qualitative variable), patient gender (qualitative variable), reason for admission (qualitative variable), site of PCP evaluation (PCP office vs. other, binary qualitative variable), degree of urgency (urgent vs. not urgent, binary qualitative variable), and whether the PCP was the patient's usual physician (binary qualitative variable). Values of $P \leq 0.05$ were considered significant. Stata 11.1 software (Stata, College Station, TX, USA) was used for all the analyses.

Results

Of the 45 960 admissions reported to the Sentinelles® network in 1997–2011, 2794 (6.1%) were for orthopaedic conditions or trauma. Most patients were older than 15 years of age ($n = 2663$, 95.3%) and there was a slight female predominance ($n = 1703$, 61.5%). The admission decision was taken by the usual PCP in 2274 (81.4%) cases. Admission was on an emergency basis in 2140 (76.6%) cases, and only 917 (32.8%) decisions were made during an office visit (Table 1). Of the 2783 patients with available information on the hospital sector chosen, 1113 (40.0%) were referred to private hospitals, compared to only 21.6% of the 45 960 admissions ($P < 0.0001$).

Among the orthopaedic/trauma patients, the most common reasons for admission were hip fractures ($n = 767$, 27.5%), scheduled surgical procedures ($n = 432$, 15.5%), fractures of the humerus ($n = 164$, 5.9%), wrist fractures ($n = 152$, 5.4%), soft-tissue lesions of the forearm and hand ($n = 139$, 5.0%), and spinal injuries ($n = 125$, 4.5%). Other reported reasons ($n = 1015$, 36.2%) included, for instance, ankle fractures, ankle and knee sprains, shoulder

Table 1 Patient characteristics.

	Orthopaedic conditions/trauma leading to admission ($n = 2794$)
Females, *n* (%)	1703 (61.0)[a]
Age, median [IQR]	74 [54–84]
Usual PCP, *n* (%)	2274 (81.4)
Office visit, *n* (%)	917 (32.8)
Emergency visit, *n* (%)	2140 (76.6)
Referral to a public hospital, *n* (%)	1670 (60.0)[a]
Reasons for admission, *n* (%)	
Hip fracture	767 (27.5)
Scheduled surgery	432 (15.5)
Fractures of the humerus	164 (5.9)
Wrist fractures	152 (5.4)
Forearm/hand injuries	139 (5.0)
Spinal injuries	125 (4.5)
Other	1015 (36.2)

IQR: interquartile range; PCP: primary-care physician.
[a] Percentages were computed using the number of patients with available data as the denominator.

Table 2 Univariate analysis: variables influencing the choice between the private and public sectors.

	Public	Private	*P* value
n (%)	1670 (60.0)	1113 (40.0)	
Female, *n* (%)[a]	1030 (60.7)	668 (39.3)	0.28
Age, *n* (%)[a]			< 0.001
≤ 15 years	105 (76.1)	33 (23.9)	
16–49 years	242 (54)	206 (46)	
50–69 years	258 (50.3)	255 (49.7)	
≥ 70 years	1062 (63.3)	616 (36.7)	
Usual PCP, *n* (%)[a]	1288 (56.8)	978 (43.2)	< 0.001
Office visit, *n* (%)[a]	387 (42.4)	526 (57.6)	< 0.001
Emergency setting, *n* (%)[a]	1452 (68.0)	683 (32.0)	< 0.001
Reason for admission, *n* (%)[a]			< 0.001
Fracture of the humerus	114 (69.5)	50 (30.5)	
Hip fracture[b]	480 (62.9)	283 (37.1)	
Scheduled surgery[b]	94 (21.8)	337 (78.2)	
Forearm/hand injuries	82 (59.0)	57 (41.0)	
Wrist fracture	94 (61.8)	58 (38.2)	
Spinal injury	108 (86.4)	17 (13.6)	
Other[b]	698 (69.2)	311 (30.8)	

PCP: primary-care physician.
[a] Some data were missing and, consequently, the total is not necessarily equal to 2794.
[b] The totals differ from those in Table 1 because the hospital sector of referral was missing for four patients with hip fractures, one patient with scheduled surgery, and six patients with other reasons for admission.

Table 3 Multivariate analysis: variables influencing the choice between the private and public sectors.

	Odds ratio [95%CI]	*P* value
Gender		
Male	1	0.33
Female	1.10 [0.91—1.32]	
Age		
≤ 15 years	0.47 [0.30—0.76]	0.002
16—49 years	1	
50—69 years	1.30 [0.97—1.74]	0.08
70—84 years	1.05 [0.78—1.41]	0.766
≥ 85 years	0.96 [0.68—1.34]	0.79
PCP		
Usual PCP	1	
Other	1.51 [1.19—1.90]	0.001
Site of visit		
PCP office	1	
Other	2.17 [1.70—2.78]	< 0.001
Degree of urgency		
Emergency admission	1	
Other	1.44 [1.07—1.93]	0.02
Reason for admission		
Fracture of the humerus	1	
Hip fracture	1.50 [1.03—2.18]	0.03
Scheduled surgery	3.30 [2.02—5.40]	< 0.001
Forearm/hand injury	1.06 [0.63—1.77]	0.83
Wrist fracture	1.17 [0.72—1.91]	0.52
Spinal injury	0.35 [0.19—0.66]	0.001
Other	0.88 [0.60—1.27]	0.49

PCP: primary-care physician.

dislocations, fractures of the pelvis, fractures of the clavicle, infected knee bursitis, or Achilles tendon rupture.

By univariate analysis, factors significantly associated with the choice between the public and private sectors were patient age, characteristics of the PCP, and characteristics of the visit (Table 2). The reason for admission also significantly influenced the choice: thus, the proportion of referrals to the private sector was lowest for spinal injuries and highest for scheduled surgery.

By multivariate analysis (Table 3), reason for admission was independently associated with the choice between the private and public sectors. When fracture of the humerus was arbitrarily taken as the reference, referral to the private sector was significantly more common in the subgroups admitted for scheduled surgery (odds ratio [OR], 3.30 [2.02—5.40]) or hip fracture (OR, 1.50 [1.03—2.18]) and significantly less common in the subgroup with spinal injuries (OR, 0.35 [0.19—0.66]). In addition, age younger than 15 year was independently associated with a lower rate of referral to the private sector. Referral to the private sector was independently associated with a decision made at the PCP's office (OR, 2.17 [1.70—2.78]) and, to a lesser degree, with a non-urgent setting (OR, 1.44 [1.07—1.93]) and with a decision made by the usual PCP (OR, 1.51 [1.19—1.90]).

Discussion

This study shows that referral to the private sector was more common for orthopaedic/trauma patients than for the overall patient population. The reason for admission was among the factors that influenced the choice between the public and private sectors. Thus, patients requiring scheduled surgery were significantly more likely to be referred to private hospitals and those with spinal injuries to public hospitals.

Few published data are available for purposes of comparison. According to a 2009 report issued by the French Institute for Research and Documentation in Health Economics, 69% of admissions for knee replacement surgery were to the private sector, the highest proportion among all orthopaedic and non-orthopaedic conditions analysed [10]. Other procedures often performed in the private sector included carpal tunnel syndrome surgery and total hip arthroplasty (over 60% and 55% of cases, respectively).

Several hypotheses can be put forward to explain our results regarding the choice between the public and private sectors for orthopaedic/trauma patients. Collaboration with the community-care system is easier with private hospitals (shorter waiting times, better availability, easier access, greater likelihood of receiving a discharge report...). This factor may contribute to explain why patients and physicians prefer the private sector for scheduled surgical procedures [11,12]. Furthermore, most PCPs keep address books listing surgeons they can contact directly when their patients require admission, and most of these surgeons work in the private sector [13]. Patients with fractures or other injuries require prompt management and may therefore be sent to emergency rooms rather than directly to a surgeon or orthopaedics department. Most medical and surgical emergencies in France are handled by public hospitals: in 2007, the number of emergency-room visits was 12.5 million (86.3%) in the public sector and two million (13.7%) in the private sector [14]. Therefore, patients with acute trauma are likely to be admitted to public hospitals, whereas those who do not require emergency care can be more easily referred to a specific surgeon or orthopaedics department in a private hospital. Spinal injuries are challenging to treat and may occur in multiply injured patients requiring management in specialised units where sophisticated equipment is available. In France, multidisciplinary teams are on duty 2 hours a day and 7 days a week in public hospitals, which is not always the case in private hospitals. These considerations may explain why most patients with spinal injuries were referred to public hospitals [15,16]. Finally, children were usually referred to the public sector. PCPs in France rarely refer patients to paediatricians in private practice, and most paediatric surgeons in France work in public hospitals [1,17].

Our study has several limitations. Reporting bias may have occurred. Over the study period, the mean number of admissions reported by each Sentinelles® PCP can be estimated at 10, which strongly suggests under-reporting. Nevertheless, under-reporting probably had a similar impact on referrals to the private and public sectors. In addition, a number of confounding factors may have been overlooked. For instance, we did not analyse the potential role for urban vs. rural site of practice or for patient income. Conceivably,

valid options in both the public and the private sector may not be available in all geographic regions. Furthermore, the socioeconomic status of the patients probably influences the choice between the public and private sectors. Finally, our data do not allow definitive conclusions about the reasons that dictate PCPs' referral decisions. The above-mentioned hypotheses deserve to be evaluated by qualitative studies.

In conclusion, specific factors seem to influence the choice between the public and private sectors for orthopaedic/trauma patients requiring hospital admission. This choice depends not only on the reason for admission, but also on characteristics of the patient, PCP, and visit. French healthcare authorities recently established pricing scales that depend only on the nature of the procedures performed [7,18] and developed identical pricing scales for the public and private sectors that will be implemented in 2018 [19—21]. These changes mandate a detailed analysis of medical practice patterns (particularly those of PCPs, who play a leading role in patient referral for hospital care) in order to ensure that the specific economic and medical features of each healthcare institution are taken into account.

Disclosure of interest

The authors declare that they have no conflicts of interest concerning this article.

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